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ABSTRACT

This report describes a project to develop a forest product technology curriculum that prepares students at the technical level, junior management, to work in the manufacturing of wood and bark into lumber, plywood, particle board, laminates, and pulp chips. Chapter 1 describes project objectives and procedures followed. In chapter 2 the history of the forest industry is overviewed, and some new (sawmill) developments and innovations are cited. Personnel needs and career opportunities are also discussed. Chapter 3 presents the six-quarter program. It also considers sources of students, admission requirements, facilities and equipment, class size, program costs, and suggested student equipment. Some general conclusions are made in chapter 4. An appendix provides descriptions of each of the 36 courses in the curriculum. Each description provides this information: course title, lecture and lab hours (per week), quarter credits, prerequisites, overview of content, course objectives, material covered and number of weeks to cover it, texts and/or references, and suggested student equipment. (YLB)

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A FOREST PRODUCTS TECHNOLOGY PROGRAM FOR WASHINGTON COMMUNITY COLLEGES

FINAL REPORT

Project No. 81-AKY(191)NN

Curriculum Development Project
Conducted Under Public Law 94-482

Robert T. Grotefend
Spokane Community College
N. 1810 Greene Street
Spokane, Washington 99208

December 1981

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RESEARCH COORDINATING UNIT
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The project reported herein was performed pursuant to a grant from the Research Coordinating Unit of the Washington State Commission for Vocational Education. Contractors undertaking such projects under the Commission for Vocational Education sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Commission for Vocational Education position or policy.

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PREFACE

In the middle 1970s, when our Natural Resources program was well established, my thoughts turned to the many other technician programs here at Spokane Community College. There are, according to a previous Dean of Instruction over 100 such programs. I discovered that, though the Washington State Community College system has technical programs for almost every occupation, there are none specifically for the forest industry. This is remarkable since the forest industry may have the top economic value in the state. If not that it has to be in the top two or three. It is distributed over the widest area of any major industry in the state. Log conversion mills are everywhere there are trees. This includes all the West side of the Cascades, the Columbia River to almost opposite The Dalles, Oregon, along the East side of the Cascades to Yakima, Ellensburg, Wenatchee and generally across the top part of the state in the Tonasket, Colville Reservation areas, from the Spokane Indian Reservation and Spokane County to the borders of Canada and Idaho. These mills are the economic and employment base of small communities in the whole area, employing many thousands plus secondary economic support for a significant percentage of whole state population. Totals from 1979 are: employment 72,816, wages $1,391,972,722, total product dollar volume $3,760,502,821 (Appendix 1).

A survey of the "Need for Sawmill Technician Training" (Appendix 2) was made May 1, 1978. The return numbers of responses were excellent, thirty-three from 100 different sawmill management people from Washington and adjacent states. There was also a strong positive response for increasing the skills of 8 occupational categories of present employees. The same 8 occupational categories would benefit from training for the entry level. My travels indicate a special need for mill operating management types as: superintendents, foremen, quality control, and specific responsibility specialists. Dr. John Howe, University of Idaho, made a survey study to find the, "Forest Products Technician Programs in the United States and Canada."[1] He found 7 such programs, all but two East of the Mississippi River. One was a small forest products quality control program at Chemeteka Community College, Salem, Oregon and both lumber and plywood, plus pulp and paper technician programs at the British Columbia Institute of Technology, Burnaby, B.C., Canada.

With the encouragement and help of Carl Martin, Chief Engineer, Idaho Forest Industries, Dr. John Howe, University of Idaho and Ronald Miller, Spokane Community College supervisor of the evening division, short and summer courses; we gave successful short courses in Kiln Drying of Inland Species (lumber) and Lumber Grading.

Many local lumber industry friends have been strongly urging a forest products program in Spokane for years.

Early last year there was an opportunity to apply for a curriculum development grant. This report is the result.

ACKNOWLEDGEMENTS

Many gracious people have given generously of their time and advice. Without them this report could not have been made. Following is a list of those who have been visited and/or provided data. Others have been contacted by phone. For those who feel they have been omitted, my apologies.

There are two special people whose assistance has been especially significant. Carl Martin, Chief Engineer, Idaho Forest Industries of Coeur d'Alene provided the original inspiration, unstinting encouragement and help for several years. "Tom" J. T. Neilsen, P. Engr, Head, Lumber and Plywood Program, British Columbia Institute of Technology, Vancouver, B.C., Canada, most generously gave his advice and data about his outstanding technician program. All my contacts and information indicate the B.C.I.T. program is an excellent example of the training needs we have here in the Northwest.

Many others have given considerable valuable help. They are listed alphabetically for the sake of brevity:

Anderson, Donald, Saw Engineer, Weyerhaeuser, Tacoma

Brown, Terrance, Ph.D., Professor, Forest Products, Oregon State University, Corvallis, Oregon

Bryant, Benjamin, Ph.D., Professor, Wood Products, University of Washington

Busse, William, Training Manager, Stetson-Ross, Inc. (lumber-planer manufacturer), Seattle

Chasteen, Sharney, Educator Relations, Weyerhaeuser, Tacoma

Clapp, Vernon, Forest Products Specialist, U.S. Forest Service, Portland, Oregon

Dehner, "Chuck" Charles, Sawmill Manager, Long Lake Lumber Company, Spokane, Washington

Duff, Gregory, Employment Relations Coordinator, Boise Cascade Corp., Kettle Falls, Washington

Fredsall, Russell M., Western Wood Products Ass'n, Portland, Oregon

Hakala, Paul, Atlas Sawmill Manager, Idaho Forest Industries, Coeur d'Alene, Idaho

Hearst, Allen L. ("Lorin"), Forest Products Specialist, U.S. Forest Service, Missoula, Montana

Hinck, Henry, V.P. Production, Idaho Forest Industries

Howe, John, Ph.D., Professor, Wood Products, (retired) University of Idaho, Moscow, Idaho

Huffman, Jack, Head Saw Filer, Idaho Forest Industries

Kozlik, Charles, Ph.D., Professor, Wood Products (lumber drying specialist), Oregon State University

McDowell, Howard, Exec. Mgr., Industrial Forest Resource Council, Missoula, Montana

McKillip, William, V. Pres., R. Hoe and Company, Portland, Oregon

Miller, George, Missoula Saws Inc., Missoula, Montana

Miller, Ronald, Supervisor of Continuing Education, Spokane Community College, Spokane, Washington

Mote, C. D., Ph.D., Professor, Saw Vibration Research, College of Engineering, University of California, Berkeley, California

Murray, Ray, Service Administrator and School Administrator, Stetson-Ross, Inc., Seattle, Washington

O'Donnell, James, Executive V. Pres., Northwest Pine Association, Portland, Oregon

Page, Rufus, Head, Wood Products Department, Haywood Technical Institute, Clyde, North Carolina

Peterson, Ronald, Western Wood Products Association, Portland, Oregon

Reierson, Larry, Manager Training and Development, Weyerhaeuser Company, Tacoma, Washington

Russell, James, Quality Control Supervisor, Idaho Forest Industries, Coeur d'Alene, Idaho

Smith, Gerald, Service Supervisor, Moore International (Dry Kiln manufacturer), Portland, Oregon

Thompson, Douglas, Quality Control Supervisor, Idaho Forest Industries, Coeur d'Alene, Idaho

Williston, Edward, Sawmill Manager (retired), now Forest Product Manufacturing Consultant and Author, Gig Harbor, Washington

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CHAPTER I, REPORT SUMMARY

a. Time period covered by the report

As given in the application the proposed beginning date was June 15, 1981 and ending was September 30, 1981. The ending date was later extended to the end of 1981. Many helpful forest industry contacts existed years before this report. In addition to a personal, long-time acquaintance with the industry I was long exposed to their expressed needs and concerns. Further background preparation was incurred during my construction of the sawmill short courses given at Spokane Community College. A few local forest industry advice and data collecting visits were made before the official beginning date of June 15. Most of the industry visitation and travel was done the later part of June and July. As can be seen from the acknowledgements these visits were to a number of people with varying backgrounds from Spokane, Coeur d'Alene, Idaho to Missoula, Montana, Burnaby (a suburb of Vancouver), B.C., Canada, Seattle, Tacoma, Portland and Corvallis, Oregon and Berkeley, California. After that some more material was gathered, data sifted through and considered. Actual assembly and writing took place during the last few months.

b. Objective and subobjectives

This curriculum is to prepare students to work in the manufacturing of wood and bark into lumber, plywood, particle board, laminates and pulp chips.

The major objectives are to construct a forest products technology curriculum that prepares technical level, junior management, plus others for highly skilled occupations for the coming years of increasing competition and rapid technological change. A further major goal is to prepare a very high standard, intensive program that meets with industry's enthusiastic support.

Subobjective one is to produce a program that industry can support in two major respects: give some financial assistance and send their promising comers to the program.

Subobjective two is to provide valuable career opportunities for ambitious and motivated people who wish to enter the field of forest products manufacturing.

Subobjective three is to provide financially rewarding, challenging and satisfying employment in smaller home towns for ambitious and promising young people without having to migrate to cities or other states.

c. Procedures followed

The procedure for this report assembly can be simply listed as several separate activities. They are:

1. The recognition of the need and idea for filling the need.
2. Hypothesis testing with local knowledgeable forest industry friends.
3. Search and survey if these needs are being filled, where and how much they are being filled.
4. Set criteria and objectives to construct, in this case, a forest products technology program.
5. Application for a grant to construct such a program.
6. Assembly of data from: specially qualified people in many aspects of the industry, learn what is being done by Northwest teachers and researchers in this field, acquisition of written reference material, both published and nonpublished.
7. Assembly, comparison, categorization and evaluation of all materials from all sources.
8. Selection, condensation and inclusion of materials into report format.
9. Formulation of results, accomplishments, evaluation, conclusions and recommendations.
10. Write-up, proofing, correction and presentation.

d. Results and accomplishments

The results and accomplishments of this study have been met with respect to: data, collection, and advice gathered from visitations. More time was spent than originally estimated.

e. Evaluation

Although there was enough time spent on the project, data collected, and people visited, more experts could have been seen and useful material gathered. Refining and fine tuning will have to be done at the inception of the program as in the beginning of any curriculum. My evaluation of the report is that the proposed curriculum is the right one in concept and the type needed. If followed closely, especially with first emphasis on quality it will be a most valuable aid to the forest products industry of Washington.

CHAPTER II, THE FOREST INDUSTRY

a. Colonial times; timber a universal material and obstacle

The first European to come to North America found a limitless supply of timbered forests. This was in sharp contrast to the old world where severe wood shortages appeared as far back as the Middle Ages. A thorough set of forest use regulations and practices was signed by Empress Maria Theresa, of the Austrian-Hungarian Empire in 1766. It is more restrictive than the one we have today for the state of Washington. Many European forests have been under intensive management for 300 or 400 years. Colonists here found the forests an obstacle. They had to be cleared for food crop agriculture. The native peoples here almost universally used wood and bark for shelter, utensils and travel (travois and canoes). Colonists used this abundant wood for homes, ships, implements, furniture and household aids. The first tools used were: the axe, adze, plane and saw, all operated by hand. To improve productivity saws were made lighter and tensioned in wooden frames. Logs were sawed by long saws with two sawyers, one on top of the log and one in a pit below. Later frame or sash saws were run by water power with mechanical linkage which moved the entire frame apparatus up and down. A number of saws were put in these frames called "gang saws," which could saw a number of boards at a time.

b. Changes in timber supply

From the start the best timber trees were cut first, then as demand continued the next, and so on. Large acreages were clear cut and burned for cultivation. Later whole regions were clear cut to supply numerous mechanical sawmills. Very large quantities of lumber were needed by our swelling population, accelerated by mass immigration. The Northeast and Coast timber were cut first, then the Great Lakes Region, next the South and last the West. Great numbers of mills followed the cutting of this virgin old growth. Land was cheap and the forest seemed endless. All the saw millers had to do was to move on to a new supply of trees. Only the better quality wood was cut. Saw teeth were wide, reducing much volume to sawdust. It was common to utilize only 40% of a tree, with many defective logs left in the woods. Heavy power logging machinery and felling on steep slopes smashed large numbers of trees. Great quantities of wood were wasted. Raw material was cheap and low production costs everything.

Harvesting old growth has reached the West Coast and Alaska. The last remaining large old growth stands are being followed into higher elevations and remote areas. As a factor influencing major supplies,

old growth timber volume is rapidly becoming insignificant. The East and South are now cutting their "third forest" and in some places the fourth. We are already heavily dependent on second growth in Washington, Oregon and California. My contacts in British Columbia tell me that the B.C. old growth is being cut much more rapidly than is being replaced by young growth. They predict a shortage of trees large enough to cut from the mid-1980s till the turn of the century, or longer. One does not have to be a forest industry person or forester to realize the average size tree harvested is growing smaller. He has only to observe the number of logs per truckload. When I came to Western Washington in 1947 one to five logs per truckload were common. Now one and three logs per load are rare and five logs per truckload uncommon. In the Spokane area loads of from 30 to 60 logs are now very common, with an average of 30 or more. Many defective logs are being delivered to sawmills that would have been left in the woods 20 or 30 years ago.

During the great depression, our forest area land base began to grow again with the abandonment of marginal farmland. Since World War II the forest area has been shrinking due to our growing population and economic activity. Some specific causes are: more land being brought into cultivation, urbanization, more highways, more pipeline and electrical rights-of-way, more mining, more airports and in recent years more wilderness set-asides.

Yet in respect to our timber supply I am optimistic. Technology and techniques have greatly improved even in the slower changing profession of forestry. Many national forestry leaders, local foresters and I are firmly convinced that we can double overall wood production. This is with knowledge available today, not in the future! As our nonrenewable resources become more scarce we will become more dependent upon wood. The chemical industry, which has produced thousands of useful synthetic compounds and products, is finding its limits in quality of life-reducing environmental effects.

For a further viewpoint the following is quoted from a paper by Benjamin S. Bryant, Professor of Wood Products, University of Washington:

> Without question, the mix of forest products required for the future will not be the same as we know it today. In some areas, such as the requirements for pulp. we can predict increases due to the rise in per capita consumption. To this will be added an increase in per capita use of composition board, particularly particle board, which, in the U.S., is only about one-third of that in Western Germany, for example. Since we persist in using plywood and framing lumber for housing in larger quantities and sizes than is dictated by economical and adequate design considerations, we can predict a decline in the per capita, or per house, use of these commodities as increases in lumber and plywood prices discourage wasteful use.

Regardless of the relative product mix, however, it is certain that greater volumes of wood will be required to satisfy the nation's needs in the future than is presently the case. What we are talking about is the fact that from our American forests we must produce more commodity products in the form of dimension and industrial lumber, pulp, veneer and composition boards. These will provide the raw material for houses, industrial buildings, newspapers, printing papers, and laminated beams for churches, schools, and industrial buildings. I would like to make it clear that we are not talking about new forest products for which there is no known use at the present time. We are talking only about the commodities that are manufactured in enormous volume and utilized in a variety of ways by remanufacturers and component manufacturers in a number of secondary industries.

This, then, is the challenge. To use a well-worn but appropriate phrase: "it boggles the mind." The question must be asked: Can American forests meet the demands upon them, and if so, how? What is the role of research or technology in meeting this challenge?

My answer is an optimistic one. There are current trends that may be identified which support an optimistic outlook. It behooves foresters to become aware of these trends in technology, for they have a distinct bearing on the whole enterprise of forest management, planning and public policy.

c. Sawmilling, a long comparatively static process

The basic sawmill was developed with plentiful steam and electrical power. Major pieces of equipment included the primary log breakdown, the headrig, secondary saws, trim saws, edgers and conveyers to the "green chain" platform where the lumber was hand-sorted. Lumber was at first air-dried then later kiln-dried and planed smooth. There were improvements and modifications but the same process survives to this day, spanning a time of over 100 years. A young person could start with little or no formal education as mill cleanup labor or on the green chain. He could rise in a number of years to: head sawyer, sawfiler, millwright or even a superintendent. As long as logs were cheap and plentiful there was little incentive to reduce waste or produce to close tolerances. There also was little need for outside education except for top management. Suppliers provided most of the equipment, process engineering and design. Career opportunities were open to young men in sawmill communities without having to leave home and without special education.

d. An industry in transition

After the great depression of the thirties and World War II major changes began. The postwar housing and commercial building boom spurred the young plywood and particle board industries. Sawmills were slow to change. My observations are that major sawmilling

improvements did not get under way until the sixties and seventies. Major factors influencing change were: increased competition for less available timber, increased timber, labor and equipment costs. In recent years productivity in relation to volume of raw material and waste has become very critical. A study by Allen "Lorin" Hearst[2] of the U.S. Forest Service has shown that sawmill efficiency programs, using the existing machines and processes can increase product greatly with the same log volume input. This paper lists recovery increases under, "Modified Attainable Mill Conditions of 9.8% and BOF* plus attainable Mill Conditions of 21.3% To quote Carl Martin, Chief Engineer, Idaho Forest Industries: "We are machining lumber not sawing boards . . . . All personnel are using measurements to 1000ths of an inch."

Professor Bryant, University of Washington[1], goes on to say in his paper:

> In a recent study of the forest products industries, I learned that large companies are spending less, not more, in research in the traditional sense. There has been a reorientation of the so-called research effort which is now directed towards the improvement of the process and the modification of the product rather than toward the development of new products. Really new products, only in rare cases, can become commodities in a reasonable enough period of time to be manufactured and sold in enough volume as to significantly affect the profitability of large integrated companies.
>
> An example will illustrate this point. Both large and small lumber producers are looking for, and making investments in, machinery to reduce the residues in lumber manufacture due to excessive saw kerf, variations in thickness, and even in the usual allowance for surfacing. Sawmill owners are investing in machinery which also lowers production cost through greater speed in processing and the use of smaller logs. They must improve recovery and increase efficiency or die.

Some new developments (sawmill developments) I have observed are: (Some sources are not listed because of their possible competitive nature.)

1. Laser light showing the cutting line of the head-rig saw on the log
2. Computer programmed head-rig BOF saw cut and sequenced log breakdown
3. Automatic or semiautomatic electric process controls
4. Automatic lumber sort green chain

---

* BOF=Best opening face (best placement of first cut on a log).

5. "Chip-n-saw" which chips away waste and cuts into lumber at one pass

6. High speed production lines that can process 1,800 small logs per shift

7. Statistical control monitoring in order to cut lumber as thin as possible within an acceptable percentage of those that are too thin

8. Electronic curing of glues in laminated timbers

9. Log peeling for plywood of 800 lineal feet per minute

10. Paper machines that make paper of up to 6,000 feet per minutes

11. The use of extra thin cutting saw blades that make less than an 1/8-inch cut

12. Cutting trees in the forest in a way to produce the most current values and volumes

13. Finger joiners that slot cut short, clean lengths, previously wasted, and glue them together for high value clear lengths

These are all common developments being currently used.

e. Mills of the future

A few new developments being currently worked on are:

1. Chip and fiber alignment in plywood and particle board[3]

2. Ultra thin saws to 1½ millimeters thick[4]

3. More complete electronic and computer controls

4. Sanding boards to closer tolerances than planing

5. Production of power from the sawmill's own bark and fiber waste

6. Inclusion of bark in particle and fiber board

7. Strong support beams made of plywood

Bryant:

It is common practice today to build houses without the use of clear softwood lumber for molding and trim and without clear softwood plywood for cabinets. Even more significant is the fact that all of the framing lumber and structural

> plywood utilized in house construction can be made, and is being made, to a large degree from logs less than 12 inches in diameter . . . . The average log diameter in Scandinavia is about 8 inches.

Note: "With acceptable one end '2x4' lumber grade 'wane,' two '2x4s' can be cut from a log with a small end diameter of 5 inches."

It is highly probable therefore mills of the future will:

1. Achieve almost complete utilization.
2. Obtain more high value product per unit volume of wood.
3. Use smaller timber.
4. Produce more precise products.
5. Produce with greater speed and efficiency.
6. Produce more with less personnel.

f. Personnel needs, career opportunities

The new technology requires new people with special training. Top management and engineers are available but the need of these people per mill is very small. At the bottom level, where education requirements are not critical, the need is low and dwindling. Rewarding career opportunities for this group are also dwindling. On an overall basis the new mills will require one-half to one-fourth total personnel. There will be a great need for specially trained, highly motivated people for production leaders, quality control and highly skilled specialists. Production superintendents and foremen will need special training to operate a high technology mill properly. Quality control people will require a depth of process knowledge, product specification knowledge and be able to supply statistical monitoring to all products and steps of production.

Equipment operation specialists require a high degree of skill and knowledge. Much of their preparation can only be obtained from equipment manufacturers and high standard schooling tailored to their needs. The times are past where those of average nonspecific education can spend many years of apprenticeship then climb the seniority ladder to key responsibility. Companies do not have the time to give such employees the background to advance in the old traditional manner.

At the same time forest product company management need highly trained motivated young people who desire rewarding careers but do not wish to leave the smaller mill communities. It is to the companies' economic advantage to avoid "brain drains" from the smaller mill towns to the big cities.

A very intensive, high quality, program is necessary to produce the quality person needed Information from all sources indicates career opportunities for anything less is remote.

A list of curriculum specifications is as follows:

1. A much more rigorous than average Community College curriculum is required.

2. In order to meet training objectives in six academic quarters a minimum average of thirty lecture and laboratory contact hours per week is also a requirement.

3. The program must have a very aggressive advisory committee to forcefully assure that the best industry standards are met in all respects including: quality of instruction, administrative support and facilities.

4. Provision is needed to accommodate those already employed in the wood products industry on alternate work and school quarters.

To further fill industry's needs high skill specialities could be added, for example: millwright, sawfiler, computerization, planer setup, lumber grading and electronic controls. Active backup and current employee upgrading as, for example: the dry kiln operation and lumber grading short courses already initiated by me and given by Spokane Community College,* is also a need that could be well filled at the same time.

Based on today's dollars pay for such trained people could easily begin at $15,000 to $18,000 per year not counting: fringes, overtime or profit sharing plans. Potential renumeration could go much higher.

CHAPTER III, THE CURRICULUM

a. Sources of students

Students are visualized as coming from three categories:

First: current employees who want to move ahead and in whom management recognizes as having the potential for greater contributions. Selected individuals might be given work leaves of absence and possibly company financial assistance.

Second: Those who wish challenging careers with potential but wish to live in the smaller forest product communities.

Third: Those who wish for extensive training for better careers but who feel they cannot afford high tuition costs plus four years or more at a university.

b. Admission requirements

In order to maintain necessary standards with acceptable attrition experience dictates prospective students be screened. They should be individually counseled, tested with final screening done by the teaching department. Considerations for admission should be:

1. Strong motivation and interest

2. Willingness to undertake a rigorous program

3. Evidence through placement or entrance tests in English and Mathematics of the ability to succeed in the program. In order to adhere to the open door policy, provision could be made to admit those who meet prescribed English and Mathematics standards after those standards are met by preparatory study.

c. Facilities and equipment

First: classrooms are needed with their usual ample blackboards, projection screen and cabinets for training aids and equipment. There will be uses for : movies, slides, overhead transparencies, easel pads and equipment models.

Second: a laboratory is needed to study macro and micro wood and wood fiber characteristics. Cabinet wood working equipment is indicated as: table saw, planer, glue vat, small wood press and

clamps. Frames, tubs for mixing adhesives and other items to make particleboard or simple fiber board are also needed. All this equipment need not be the most expensive and of shop or laboratory study sample batch size.

Highly desirable would be a work bench for saw welding, grinding, tensioning, sharpening and planer knife sharpening.

Also required are product and equipment measuring and guaging instruments. This includes meters and other devices used in quality control. One piece of equipment large enough to give meaningful data and training is a lumber dry kiln. The dry kiln should be long enough to take batches of 8-foot boards, piled four feet wide and five feet high. Lumber batches could be wheeled in and out on a flat steel cart running on tracks. A standard large microwave oven is large enough to dry samples in the laboratory.

Studies, data gathering, and running supervised tests in actual mills are important. Visitations to many examples of different manufacturing processes also must be included. This means a need for frequent 12-passenger van use as a requirement of certain courses.

d. Class size

The maximum lecture class size should be 25. Most laboratory exercises need to be within a limit of 12 to 14 because of space-consuming wood working tests and other materials handling projects. There are safety advantages in having a smaller group operating wood working power tools. The larger classes may also have to be divided to work on projects in mills. I envision about 25 students the first year and 20 the second year. A graduation class of 16 to 18 would be ample. The emphasis should always be on employability not numbers. In order for quality instruction and for enough expertise, training there needs to be a minimum of three full-time instructors.

e. Program costs

The equipment costs should not be excessive, certainly not as much as equipment intensive programs as: machinist, electronics, and heavy equipment. The student ratio per instructor will be somewhat higher than average, about 1 to 12 to 1 to 15. This is most necessary to meet the program quality objectives. Last there are the previously mentioned travel requirements. Compared to industry and state economy benefits it should be quite reasonable.

f. Suggested student equipment

The students will need, in addition to specific texts, notebooks and paper, a calculator (preferably programmable), a simple set of drafting equipment and possibly also a few personal tools, gauges or measuring devices.

g. The program by quarters and courses

The summary of courses, school hours per week, credit hours and total hours per course.

COURSES

Quarter No. 1 (11 weeks)	Course No	Hours per wk	Credit Hours	Total Hrs per course
Forestry Industry Orientation	FI-100[1]	2c[2]	2	22
Technical Communication (composition)	FI-101	5c	5	55
Forest Utilization	FI-102	3c 4L[3]	5	77
Wood Products Mathematics	FI-103	3c 3L	5	66
Lumber Computations	FI-104	3c 3L	5	66
Forest Products Seminar	FI-105	1c 1L	1	11
		28	23	297
Quarter No. 2 (10 weeks)				
Lumber Grading I	FI-106	2c 4L	3	60
Forest Industry Physics I	FI-107	3c 2L	4	50
Drafting I	FI-108	4L	2	40
Wood Industry Materials	FI-109	3c	3	30
Descriptive Writing & Oral Reports	FI-110	3c	3	30
Forest Industry & Product Economics	FI-111	2c	2	20
Statistics & Quality Control	FI-112	3c 3L	4	60
		29	20	290
Quarter No. 3 (10 weeks)				
Log Scaling & Utilization	FI-113	2c 4L	4	60
Lumber Grading II (Lab ½ on campus ½ off campus)	FI-114	2c 4L	3	60
Forest Industry Physics II	FI-115	3c 2L	4	50
Statistics & Quality Control II	FI-116	3c 2L	4	50
Drafting II	FI-117	4L	2	40
Wood Properties	FI-118	4c	4	40
		30	21	300
Quarter No. 4 (11 weeks)				
Operations Management I	FI-119	2c 2L	3	44
Advanced Technical Communications	FI-120	3c	3	33
Manufacturing with Wood I	FI-121	2c 6L	4	88
Production Support Activities I	FI-122	5c	5	55
Mechanical Mill Equipment I	FI-123	5c	5	55
Programmable Calculator & Computer Applications	FI-124	2c 2L	3	44
		29	23	319

[1] FI = Forest Industry
[2] Lecture class hours
[3] Laboratory hours

COURSES

Quarter No. 5 (11 weeks)	Course No	Hours per wk	Credit Hours	Total Hrs per course
Production & Electrical Motors	FI-125	8c	8	80
Technical Reports	FI-126	2c	2	20
Linear Programming	FI-127	3c 3L	5	60
Basic Micro Computers(BASIC LANGUAGE)	FI-128	5L	2	50
Operations Management II	FI-129	2c 3L	5	50
Manufacturing with Wood II	FI-130	2c 3L	5	50
		31	27	310
Quarter No. 6 (10 weeks)				
Production Improvement Case History Studies	FI-131	2c	2	60
New Equipment Development	FI-123	6c	6	60
Manufacturing with Wood II	FI-133	2c 4L	4	60
Production Support Activities II	FI-134	2c 4L	4	60
Wood Product Sales & Distribution	FI-135	5c	5	50
Research Project & Report	FI-136	1c	2	10
		26	23	300
Summer or between quarters technical report			2	

ON DETAILS OF COURSES, SEE APPENDIX

CHAPTER IV, CONCLUSIONS AND RECOMMENDATIONS

The conclusions listed are:

1. There is a strong need for a forest products technology program in the State of Washington.

2. It would make a substantial contribution to the economic health of the forest industry and therefore to state and local communities.

3. To be of value the highest quality training is an absolute must! Implementation of the format requirements given in Chapter III is also a must!

4. Strong active support by private industry is necessary.

5. Private industry financial aid would be a great help.

6. In my opinion only one or two such programs in the state are sufficient.

7. Spokane is a logical place for such a program as:
   --it is the center of many wood products mills
   --Spokane Community College District 17 has the most complete facilities in the state.

Such a program, as proposed, could be the most valuable of any Community College program in Washington. Properly constructed and executed it could:

--draw some industry financial support
--add greatly to the sponsoring community's status
--achieve high industrial and academic recognition in the state

If a school cannot go all out for quality such a program should not be undertaken! In the words of one sawmill management executive, "If we want just a sawmill worker we can give him a week or so of safety and task orientation plus some on-the-job supervised training." One local prominent sawmill in this area employed about 130 people. It was shut down and rebuilt. Modern, more precise high speed equipment was put in, provisions were made to handle an estimated 1,800 small logs per shift, narrower cut saws were installed, laser light controls were installed on the head rig, automatic lumber sorters incorporated and electronically controlled throughout. Mill employment decreased to about 40 but production doubled. The few needed professional managerial people were

retained. The specialists and most skilled also remained. To keep such a mill operating properly high school graduates are inadequate. The most highly trained people are absolutely necessary to profitably operate the new higher technology mills now and those coming in the future.

Except perhaps for the very largest forest industry companies, they do not have the resources for a thorough training program.

Community Colleges are the best equipped to perform the required training with the least cost of any organization in the state, public or private.

If there are any who doubt the value of the forest industry to Washington he has only to look at what the present condition is doing to the economy of the state. THERE IS THE OPPORTUNITY AND CHALLENGE!

APPENDICES

APPENDIX-1

(1). Forest Industry Production Value, Employment and Wages

FOREST PRODUCTS STATISTICS 1979

WASHINGTON

Type of product	Production	Value
Lumber		
Douglas Fir Region	2,805,000 M Bd Ft[1]	$ 781,000,000[1]
Ponderosa Pine Region	1,036,000 M Bd Ft[1]	302,000,000[1]
Plywood	1,727,352 M Sq Ft[2]	310,295,000
Shingles and Shakes	2,878,000 Squares[3]	148,648,700
Pulp	2,370,786 Tons	
Paper and Paperboard	2,095,182 Tons	1,100,796,505
Hardboard, Particleboard and Insulation Board	12,000 M Sq Ft	1,369,800
Log Exports	2,252,560 M Bd Ft[4]	993,729,256[4]
Chip Exports	346,209 Tons[4]	17,327,760[4]
Poles and Piling	12,625 M Lineal Ft[5]	22,255,000[5]
Panel Doors	1,296,000 Doors[6]	71,280,000
Christmas Trees	2,980,000 Trees	11,800,800
Total:		$3,760,502,821

Source:

[1]Western Wood Products Association
[2]American Plywood Association
[3]Red Cedar Shingle and Handsplit Shake Bureau
[4]Pacific Northwest Forest and Range Experiment Station
[5]Industry estimate acquired by Industrial Forestry Association
[6]Western Wood Products Association & Industrial Forestry Association
[7]Washington Employment Security Department
All other values estimated by Industrial Forestry Association

FOREST INDUSTRY EMPLOYMENT[7]

Number	Wages
72,816	$1,391,972,722

Compiled by
Industrial Forestry Association
225 SW Broadway--Room 400
Portland, OR 97205

November 1980

APPENDIX-2

(2) RESULT SUMMARY

Thirty-three returns from mailings to 100 different sawmill management people.

May 1, 1978

TO:

FROM: Spokane Community College
Washington State Community College District 17

RE: NEED FOR SAWMILL TECHNICIAN TRAINING

Several forest products companies have contacted the college and asked for sawmill specialty vocational training courses. In order to initiate educational programs at Spokane Community College, please help us by completing the following needs of your company:

(RETURN RESULTS)

	Entry Level	Upgrading Present Employee
SAWFILER	16	13
SAWYER	11	10
DRY KILN OPERATOR	8	10
LUMBER GRADER	8	10
PLANER SETUP	9	11
QUALITY CONTROL	6	13
MILLWRIGHT	14	14
BOILER OPERATOR	14	12
OTHER: Mechanic	2	2
Electrician	1	2
Lumber Edgerman	1	1
Logging and Loghandling	1	1

Any additional suggestions or comments will be most helpful:

I. Number training types requested
II. Number of entries

I	II	I	II
1	1	6	2
2	2	7	1
3	3	8	2
4	6	9	1
5	3		

Perhaps a discussion with you or your training specialist would be of mutual benefit in outlining desired programs. I will be pleased to review this further at your convenience. Please contact me at (AC 509) 535-0641, Ext. 230.

Cordially,

Robert T. Grotefend
Instructor, Natural Resources

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI-100 Date December 1981
Course Title Forest Industry Orientation
Department Forest Products
Hours per week: Lecture 2 Lab - Quarter Credits 2
Prerequisites Program Admission

Course Description (for catalog)

This course covers the raw material source of our forest industry: the forests, the trees, forestry practices, logging practices, identification of commercial tree species and related indicator plant communities. Problems of past forest and lumbering activities are covered in relation to improvement changes for present and future. Basic wood technology, anatomy and structure is covered as an introduction to further study.

Course Objectives

The main objective is to gain an understanding of the national, Northwest and especially Washington forest industry.

More specifically to recognize the major timber producing areas and major commercial species of trees.

1. Recognize basic logging equipment and methods.
2. To understand which species are utilized for what products.
3. To identify common wood and other plant species by foliage, fruit and bark.
4. To recognize the macro structures of wood.
5. To recognize the micro structures of wood.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Industry Orientation — Course No. FI-100

Summary and material covered:	Number of weeks
Forest timber resources by area, type and species Availability of old growth, second growth	1
Forestry: Intensive management developments Land ownership, administration, silviculture, protection, harvesting, management for the future	1
Dendrology and botany with emphasis on commercial tree identification, silvics, and key indicator plants	4
Forest and lumbering practices problems of the past	1
Wood technology and structure	3
Wood preparation for study	1
	11

Texts and/or references:

"Trees of North America," Preston
"Textbook of Dendrology," Harlow and Harrar, latest edition, McGraw-Hill
"Textbook of Wood Technology"
"The Plant World," Fuller, Carothers, Payne, Balbach, latest edition, Holt, Rinehart and Winston, Inc.
Habitat Plants (of N.E. Washington and North Idaho), U.S. Forest Service

Suggested Student Equipment:

None

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI-101 Date December 1981
Course Title Technical Communication
Department Forest Products
Hours per week: Lecture 5 Lab - Quarter Credits 5
Prerequisites Program admission

Course Description (for catalog)

This course covers writing and oral reporting for forest industry employment. The format is one of both lecture and student participation. Exercises are given in study skills, effective reading, writing, and speaking, practicing skills of clear, concise writing of reports, letters, resumes, memos, technical reports, oral reports and presentations.

Course Objectives

To enable the student to communicate effectively as required for Forest Products employment with both the written and spoken word.

1. To learn how to study
2. To write clear, effective business letters and resumes
3. To organize logically: facts, ideas and data
4. To present them effectively orally and in writing
5. To present technical material in a clear and easily understandable form

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Technical Communication (composition and oral) — Course No. FI 101

Summary and Material covered	Number of weeks
Study habits: organizing one's self, time budgeting study skills and note keeping organization and condensation of material	½
Descriptions: economy of words, effectiveness of words condensation and precision of statements	1½
Library Research and Documentation	1
Report Formats: organization and presentation of material	1
Writing business letters and resumes	1
Write an operational or process report with credits & documentation	2
Give an oral or process report using visual aids	1
Class critiques and analysis of written and oral reports	3
	11

Texts and/or references

"Technical Communication," Fear, 1977
"The Least You Should Know about English," Glazier, 1977
"Guide to Research and Report Writing," James L. Attebury, Ruth D. Attebury, 1974,
Tom's Books, Inc.
725 West Jefferson Blvd
Los Angeles, CA 90007

Suggested Student Equipment

Note paper
Access to a typewriter

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI-102 Date December 1981
Course Title Forest Utilization
Department Forest Products
Hours per week: Lecture 3 Lab 4 Quarter Credits 5
Prerequisites Program admission

Course Description (for catalog)

This course covers the utilization, manufacture, processing and marketing of the major types of wood products. Prominent product groups manufactured in Washington are emphasized. Employment opportunities, industrial changes, future technological developments are also covered.

Course Objectives

The main objective is to get an overall understanding of the forest industry from the utilization standpoint.

Following objectives are to have an understanding and knowledge of:

--various products and their manufacture as: poles, piling, mine timbers, wood treated materials, lumber, plywood, fiberboard, hardboard, furniture, pulp and paper
--the markets, end uses of, competitive position, and futures of these products
--employment opportunities working with these various products

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Utilization FI 102

Summary and material covered	Number of weeks
Introduction, the production of products from wood Units of measure for: log, pole, veneer, shingle, plywood and fiber, fiber measure	½
Preparation of cutting plans and log dimensions for best utilization	½
Types and relevance of residue utilization to forestry The challenges of better utilization	
Poles, piling, mine timbers, wood treating, types of sawmills, lumber manufacture, product recovery, drying, and schedule adjustment	1
The plywood industry, manufacturing, processes, markets for and uses of plywood. The fiberboard manufacture markets, properties and technology	1
The hardboard industry, manufacturing, properties, markets and process technology. Particle board process technology, properties	1
Pulping, paper making technologies, species utilization and recycling	1
Case studies, mill visits and reports	6
	11

Texts and/or references

"Forest Products," by Panshin, Harrar, Bethel and Baker, McGraw Hill, 1962, or latest
References selected by instructor

Suggested Student Equipment

- Note paper

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI-103 Date December 1981
Course Title Wood Products Mathematics
Department Forest Products
Number of credits: Lecture 3 Lab 3 Course Credits 5
Prerequisites Program admission: passing score on entrance test in algebra and trigonometry

Course Description (for catalog)

Basic mathematics, algebra, trigonometry, precision, accuracy, geometry, linear equations, logarithms, vectors, regression curves are covered as a background for wood product physics plus other production and equipment problem solutions.

Course objectives

The first objective is to give the student a basis for mathematical problem solving:

--to review and sharpen mathematics abilities, to use basic mathematics, decimals, volumes, ratio and proportion

--to give students proficiency in the application of algebra, trignometry for the solution of technical problems

--to demonstrate the utility and value of mathematics used in forest products technology

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Wood Products Mathematics — Course No. FI-103

Summary and material covered

The electronic calculator[1]	-
Introduction: accuracy, precision, units, dimensional analysis, metric vs English measurement systems	1
Algebra: basic algebra review equation systems, method of determinants, quadratic equations	2
Geometry: elementary review, perimeter, area and volume formulas, geometrical shapes, similar and right triangles	1
Linear Programming: graphical solutions, linear inequalities, objective constraints	1
Trigonometry: elementary functions, angles, radian measure, right angle trigonometry, laws of sines and cosines, trigonometric identities, equations and inverse functions, trigonometric function graphs, vectors, application of vectors	3
Empirical Linear Equations: summation of notation, equation, equation of best fitting line	1
Exponential and Logarithmic functions: review and theory, computations using logarithms and logarithmic graph papers, regression curves and graphs	2
	11

[1]Calculator use as applied throughout course
[2]Also included as applied with succeeding material

Tests and/or references

"Basic Technical Mathematics Explained," by Thomas P. Zurlich, latest edition, publisher: McGraw Hill.
Handouts of selected exercises and problems

Suggested Student Equipment

Electronic calculator
Graph and chart paper as assigned
Drawing compass, triangle and rulers with designated scales

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI 104 Date December 1981
Course Title Lumber Computations
Department Forest Products
Number of hours: Lecture 3 Lab 3 Quarter Credits: 5
Prerequisites Ability to work quickly and accurately with decimals, fractions and volumes.

Course Description (for catalog)

This course covers the tallying and computation of various grades and sizes of lumber for inventory and shipping. Rail car and truck capacities and weights, bills of lading and demurrage are included. Calculations include board feet measure, shipping volumes, moisture content, shrinkage and costs.

Course Objectives

The first objective is for the student to be able to qualify as a starting lumber tally person. This level of achievement required is:

--be able to perform lumber shipping calculations

--be able to prepare lumber for shipment

--be able to solve problems in lumber shipment

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Lumber Computations — Course No. FI-104

Summary and material covered	Number of weeks
Conversion of board and lineal feet to volumes	1
Calculation of average widths and thickness by board feet	2
Calculation of lengths and proportional sections to fit into a load	2
Calculation of cubic and net volumes to make up a shipment	2
Preparation of shipping bills of lading and other required paper work	2
Preparation of bundled and packaged shipments	2
	11

Texts and/or references

Basic fractions, decimals and volume figuring handouts and/or text
Western Lumber Grading Rules published by Western Wood Products Association, Portland, Oregon
Basic Lumber Figuring (COFI) from Canada
Western Lumber Grading Rules (81) Western Wood Products Association
Selected exercises and problems as provided by instructor

Suggested Student Equipment

Tallyboard, measurement tapes and gauges

FOREST PRODUCTS TECHNOLOGY

Quarter 1 Course Number FI 105 Date December 1981
Course Title Forest Products Seminar
Department Forest Products
Hours per week: Lecture 1 Credit 1
Prerequisites Program admission

Course Description (for catalog)

This is a forum for bringing presentations and topics that do not fit the regular curriculum. Guest speakers, special problems, unique technological developments are emphasized. It is also a forum for students and graduates to bring their experiences and thoughts about job success requirements to others in the class.

Course Objectives

The main objective is to bring to the students special knowledge and experiences not available in regular classes.

The other, equally important objective is for the students to help each other through the sharing of work experiences and suggestions for job success.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Products Seminar — Course No. FI 105

Summary and Material covered — 11 weeks

The course will be relatively unstructured to allow for maximum flexibility to take advantage of special technological and experience information. Featured will be:
guest speakers with prominent technological skills, forest product business experience and production leaders;
Graduates and students to share their experiences and impressions;
The instructor will fill in with special selected topics, summarize, and moderate the proceedings.

Texts and/or references

References and handouts as selected by instructor

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI 106 Date December 1981
Course Title Lumber Grading I
Department Forest Products
Hours per week: Lecture 2 Lab 4 Quarter Credits 3
Prerequisites Program admission

Course Description (for catalog)

This course covers the theory, characteristics, identification and grading of lumber with reference to species, defect, grade and valuation of lumber. Emphasis is an acquisition of grading skill by frequent drill, testing and performance critique.

Course Objectives

This is the first half of a skill-competence course.

The objective of this course portion is to enable the student to:

--identify and describe tree growth and wood structure of Washington commercial species

--identify the species and species groups of lumber from these Washington trees

--place these species and species groups in their product end uses and values

--classify these woods with reference to their natural properties and seasoning irregularities

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Lumber Grading I — Course No. FI 106

Summary and material covered		Number of weeks
Introduction:	Tree growth and wood structure by species	1
	Species identification characteristics Species identification	2
	Classification of lumber	1
	Characteristics in wood Manufacturing and drying irregularities	2
	Drill, review, test and retest to achieve objectives proficiency	3
	Course analysis and student critique	1
		10

Texts and/or references

"Western Lumber Grading Rules," 81, Western Wood Products Association
"Random Lengths," Northwest Lumber price quotations by species, grade, dimensions and date

Suggested Student Equipment

Grade tally board and sheets
Gloves for lumber handling
Lumber marking crayon

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI 107 Date December 1981
Course Title Forest Industry Physics I
Department Forest Products
Hours per week: Lecture 3 Lab 2 Quarter credits 4
Prerequisites Program admission, Wood Products Mathematics

Course Description (for catalog)

This course covers an introduction to properties, physical relationships and principles. It also goes on to cover physical qualities, their relationships and effects on each other.

Emphasis is on concepts and principles applied to forest industry production and processes. Laboratory emphasizes measurement techniques.experiment techniques and analysing data.

Course Objectives

1. Obtain a knowledge of fundamental concepts of physics. Emphasis is placed on subjects relevant to professional needs.
2. Acquire skills for making measurements and handling apparatus
3. Gather and analyse experimental data, both mathematically and graphically
4. Be able to draw conclusions from observations and experiments
5. Develop orderly thinking processes to solve problems

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Industry Physics I — Course No. FI 107

Summary and material covered	Number of weeks
Introduction: Units and conversions volume and temperature scales vectors graphic solutions estimating, problem-solving	1
Mechanics: displacement, velocity, acceleration	1
Statics: translational and dynamic equilibrium diagrams, straddle carrier	
Motion: force, inertia, friction, problems of unbalanced forces, log carriages, cranes	1
Work: conservation of energy, power, efficiency, kinetics and internal energy applied to conveyer power needs	1
Basic machines: inclined plane, wedge, mechanical advantage friction efficiency of simple machines	1
Circular motion: angular frequency, acceleration, paper on rotating drums, clarifiers, separators	1
Rotational applications chain saw, fork lifts, cranes, rotational torque, power transmission dynamics	1
Impulse and momentum, hydraulics and hydraulic barker Fluid Mechanics, solids, liquids, gases, pressure	1
Hydrostatics: Archimedes, guage and total pressure, hydrometers, surface tension capillarity	1
Hydrodynamics rates of flow, Bernoulli's equation speed from orifice. Settling rates, viscosity, centrifuge, Venturi and pilot tube meters	1
	10

Texts and/or references

"Introductory Applied Physics," 1972, or latest edition, McGraw-Hill
"Elements of Physics," 1972, or latest edition, McGraw-Hill
"College Physics," 4th edition, 1974, Wesley, Sears, Zemansky and Young
"Applied Physics," 1976, Schaums Outline Series, Arthur Beiser

Suggested Student Equipment

Notebook and graph paper

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI 108 Date December 1981
Course Title Drafting I
Department Forest Products
Hours per week: Lecture - Lab 4 Quarter Credits 2
Prerequisites Program admission

Course Description (for catalog)

This course covers the use of mechanical drawing instruments. It includes geometric, isometric sketching, orthographic projections, sections, auxiliary views and dimensioning.

Course Objectives

To achieve basic ability to produce mechanical for graphical illustration necessary in industry.

The student is expected to draw neatly and completely basic orthographic figure views.

The student is also expected to print legend, dimension and graphically draw to reduced or larger scale.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Drafting I — Course No. FI 108

Summary and material covered	Number of weeks
Introduction: pretest of sketching ability, printing and dimensioning exercises, outline of objectives	1
Geometric scales and constructions	1
Orthographic and isometric drawing	1
Shape theories and geometric descriptions view construction, interpretation of view construction	1
Theory and execution of shape drawings with layout, sketching, and planning least number of views, make up bill of materials for working drawings	2
Continued sections, dimensioning and sketchings to different scales	1
Perspective drawing Auxiliary views including selected elements of above	1
Final test project to include as close to all above features as possible	2
	10

Texts and/or references

Selected drafting text that includes instruction and exercises of above mentioned material.

Suggested student equipment

A drafting set that includes: 360° protractor, 30° and 45° set squares, 30" T-squares, metric scale, 2 H sandpaper block, mechanical pencil, erasing shield lettering guide, 2 1x1

Plus sheets of drawing paper and vellum as selected by instructor.

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course No FI-109 Date December 1981
Course Title Wood Industry Materials
Department Forest Products
Hours per week: Lecture 3 Quarter credits 3
Prerequisites: Program admission

Course description (for catalog)

Covered are basic materials, their properties and behavior to the pulp and paper industry. Studied are concrete, plastic polymers and metals. Causes of the failures of these materials due to corrosion, embrittlement and fatigue are studied to arrive at corrective and preventive measures.

Course Objectives

The principle objective is for the student to acquire a basic knowledge of the applications of engineering materials used in the mill. Included is structure behavior and properties of such materials.

The application of this knowledge to practical uses in the mill.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Wood Industry Materials — Course No. FI 109

Summary and material covered	Number of weeks
Introduction: the principles of loads and strains, tensile strength, yield strength, modulus of elasticity, measurements and problems	1
Fatigue failure of metals, impact testing, hardness testing and brittle failure, especially steel, use of alloys	2
Chemical structure and introduction to polymers, polymerization, relevant chemistry	1
General properties and classification of types of polymers	1
Strengthening plastic materials methods. Forming and manufacturing with plastics	1
The properties and applications of fiber reinforced plastics in the pulping industry	1
Applications of natural and synthetic types of rubber for seals, diaphrams, hoses and other uses	1
Practical prob'ems, review and final test	2
	10

Texts and/or references

Texts on strengths of materials and above characteristics.
Selected engineering materials laboratory manuals.

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI 110 Date December 1981
Course Title Descriptive Writing and Oral Reports
Department Forest Products
Hours per week: Lecture 3 Quarter credits 3
Prerequisites Technical Communication FI 101

Course Description (for catalog)

The course is continued preparation for writing and oral reporting of business and technical material in the forest products industry. The student performs exercises of various formats, letters, instructions, directions, directive memos and technical reports.

Course Objectives:

Practice clear, effective, descriptive writing and oral reports for occupational technical communication:

1. How to select and organize ideas and facts
2. Put these ideas and facts in a logical and orderly sequence.
3. Present these ideas clearly and unambiguously with economy of words without sacrificing any facts or contents.

The student is expected to convey this information in a style that is effective for memos, instructions and letters, written and oral reports.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Descriptive Writing and Oral Reports — Course No. FI-110

Summary and material covered	Number of weeks
Letters and memos, the approach, body and close in tone, form, word economy directness	1
Wordage condensation. Remove fillers, wordy phrases and unnecessary repetition	2
Letters of application, resumes. Interview techniques	2
Improvement of writing exercises in above subjects; exercises in writing style	1
Specific reports: quality control, production and process reports, physics, testing, trips and mill accident investigation	1
Writing improvements exercises in punctuation, capitalization and being specific	1
Writing directions and instructions	1
Major report on selected topic due at end of quarter	1
	10

Texts and/or references

"The Least You Should Know about English," Glazier, 1977
"Technical Communication," Fear, 1977
"How to Write for the World of Work," Pearsall and Cunningham, 1978

Suggested Student Equipment

A recent Webster's comprehensive dictionary
A good Thesaurus

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI 111 Date December 1981
Course Title Forest Industry & Product Economics
Department Forest Products
Hours per week: Lecture 2 Quarter credits 2
Prerequisites: Wood Products Mathematics

Course description (for catalog)

This course covers the business and economic aspects of the forest industry from colonial times to the present. Reviewed are the supply and demand market, government policy effects on demand, forestry and growing timber in relation to the market, timber stumpage purchases, product sales, future demands and markets.

Course Objectives

To give an understanding of forest industry activity in relation to national monetary policy, wood products imports versus exports, interest rates, availability and size of timber

To understand the impacts of depreciation rates, cash flow and new technology.

To understand the effects of free competitive markets versus narrow markets, the impacts of cyclic markets especially in lumber.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Industry & Product Economics — Course No. FI 111

Summary and material covered	Number of weeks
I. The Colonial Treasure Store "Free" timber, timber as a settlement and economic obstacle Harvesting the timber "mine" Economics of storehouse exploitation	1
II. The supply and demand market A classic cyclic industry Market effects of unlimited supply Species selectivity over time, "Hi-grading" The basic commodity product market Small mills, large mills and capital requirements The wood product company in relation to: owned capital base, capital requirements, advancing technology	2
III. Government policy effects on demand The home building industry, home mortage rates The business climate, depreciation and interest Forest Service and Department of Interior timber sales policies	2
IV. Forestry, growing timber The shrinking forest land base with increasing population Tree growing costs, stumpage prices and inflation How much timber can we produce?	1
V. Timber stumpage purchases A. U.S. Government timber sales Timber appraisals, the bidding process, bases for payment B. State timber sales, methods and processes C. The private ownership and woodlot market	2
VI. Product sales A. The importance of product knowledge B. Lumber sales, wholesale, the broker, retail yards and building supply C. The export and import markets D. Secondary markets E. Specialty markets F. Future demands and markets	2
	10

Texts and/or references

Basic economics text, micro and macro economics
Selected readings and handout materials

Suggested student equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 2 Course Number FI-112 Date December 1981
Course Title Statistics and Quality Control I
Department Forest Products
Hours per week: Lecture 3 Lab 3 Quarter credits 4
Prerequisites Successful completion of Forest Products Quarter 1
and especially Wood Products Mathematics FI-103

Course Description (for catalog)

Covered are the basics of descriptive statistics to include: the mean, median, standard deviation, mode, variance, Z-scores, probabilities, Binomial, Poisson, and normal distributions, sampling, method of least squares, correlation, control charts, Sign, Rauk-Sum and Runs tests. Practical application of statistics to forest products manufacture is stressed.

Course Objectives

The object of this course is to familiarize with statistics, their benefits and applications in the forest products industry. When completed the student should be able to:

1. Use basic statistical procedures to gather, summarize, analyse and interpret statistical data.

2. Have an understanding of the use of statistical information to make inferences to improve production efficiency.

3. Prepare the student to use and understand specialized and more advanced statistical information.

4. Prepare the student for more in-depth study and proficiency when taking Statistics and Quality Control II.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Statistics and Quality Control I — Course No. FI-112

Summary and material covered	Number of weeks
Introduction: What are statistics? Graphical presentation of data, random sample, statistical sampling	1
Statistical measures: Central tendencies, variations Mean, weighted mean, range, mode, percentiles, variance, standard deviation, coefficient of variation, Z-scores, coefficient of skewness	1
Sampling distributions, sampling distribution of the means, central unit theorem	1
Probability with: sets, outcomes, events, tree diagrams, definitions of probability, conditional probabilities, rules of probability	1
Probability distributions with: Binomial, Poisson, Normal and probability distributions in general. Application of normal distribution and approximating binomial distribution.	1
Analyses of paired data with: time series, method of least squares, coefficient of correlation	1
Estimations with small and large samples. Estimation of means, proportions, standard deviation, differences between proportions, differences between means.	1
Hypothesis testing with: testing procedure, types I and II errors, tests concerning proportions, means, differences of proportions, differences of means, contingency tables, goodness of fit and Chi-square distribution	1
Quality control and nonparametric statistics with: attribute and variable control charts, control chart concepts, acceptance sampling, Raut-Sum, Sign and Runs tests	2
	10

Texts and/or references

"Statistics and Probability in Modern Life," by Joseph Newmark, published by Holt, Rinehart, Winston, 2nd edition.
Hoel: "Elementary Statistics."
Freund: "Modern Elementary Statistics."
Spiegel: Statistics from Schaum's outline series.
ASTM Manual on Presentation of Data and Control Chart Analysis

Suggested Student Equipment

Calculator, chart and graph paper

FOREST PRODUCTS TECHNOLOGY

Quarter 3 Course Number FI 113 Date December 1981
Course Title Log Scaling and Utilization
Department Forest Products
Hours per week: Lecture 2 Lab 4 Course credits 4
Prerequisites Wood Products Mathematics

Course Description (for catalog)

This course contains instruction in log scaling for computation of volumes for the major wood product groups as: lumber, plywood, pulp chips, veneer, particle and chip boards. Included are water and dry land sorting procedures, calculations for product recovery in conversion mills.

Course Objectives

The objectives of this course are to:

--identify and grade Washington species of tree logs

--grade logs by the: Idaho Log Grading Rules, Puget Sound Scaling Bureau or Columbia River Scaling Bureau depending upon location of the program

--lay out a typical dry land or water log sorting

--from mill requirements calculate recovery volumes for: lumber, plywood, veneer, pulp chips and wood shavings for particle board

FOREST PRODUCTS TECHNOLOGY

COURSE TITLE Log Scaling and Utilization — Course No. FI 113

Summary and material covered	Number of weeks
Introduction to scaling, specie identification	
Scaling sound logs by length, diameter, taper and straightness, volume deductions for irregular shapes	1
On log decks or log booms	2
Scaling with volume deductions for rot, splits, ring shake, cracks, spiral grain and other defects	1
On log decks or log booms	3
Practice in planning dry land sorting, water sorting	1
Recovery computations for lumber, plywood, veneer, pulp chips, wood shavings and wood particles	1
Final practice, final tests and if possible the log scalers certification test	1
	10

Texts and/or references

Appropriate regional log scaling instruction and rule book.

Suggested Student Equipment

Log scaling tally sheets
Long point pen knife
Scribner Decimal C scaling stick, measuring tape and tree calipers
Hatchet
When on water, caulked boots provided by students
Life jackets, scaling sticks, hard hats furnished by school

FOREST PRODUCTS TECHNOLOGY OUTLINE

Quarter 3 Course No. FI 114 Date December 1981
Course Title Lumber Grading II
Department Forest Products
Hours per week: Lecture 2 Lab 4 Credit Hours 4
Prerequisites Lumber Grading I

Course Description (for catalog)

This course will continue the instruction of the board species identification and grading. Covered are the wood defects and characteristics used to determine grades of various types of lumber. Grading is done for the following products: rough dimension, boards, light framing, joists, planks, clears, rough and surfaced, posts, timbers, beams, stringers, large clears, door and window stock.

Course Objectives

The objective in this course is to improve the speed and accuracy in lumber grading. It is the further objective that the student pass the test to receive a certificate in lumber grading.

FOREST PRODUCTS TECHNOLOGY

COURSE TITLE Lumber Grading II — Course No. FI 114

Summary and materials covered	Number of weeks
Lectures and overhead projections of defects and irregularities	1
Drill and discussion of details in grading	
Practice grading in class of: dimension, boards, light framing, joists and planks, all grades starting with clears	4
Drills and tests concurrent with instruction	
Further grading including door stock, window framing, and moulding, clears, timbers and other grades	
Off campus grading at a mill, critiques, discussion of scores. The fine points of grading those pieces that seem on the borderline between grades.	4
Practical exams off campus at the mill and certification test	1
	10

Texts and/or references

Western Lumber Grading Rules, 81, Western Wood Products Association

Suggested Student Equipment

Gloves, lumber crayon, tally board and sheets

FOREST PRODUCTS TECHNOLOGY

Quarter 3 Course Number FI-115 Date December 1981
Course Title Forest Industry Physics II
Department Forest Products
Hours per week: Lecture 3 Lab 2 Course Credits 4
Prerequisites Forest Industry Physics I

Course Description (for catalog)

This course is a continuation of physics related to forest products mill work. Topics covered include the many aspects, with practical applications of fluid mechanics consisting of hydrostatics, hydrodynamics, and thermal energy. Practical exercises and problem solving are emphasized throughout.

Course Objectives

To obtain a knowledge of fundamental concepts of physics. Emphasis is placed on subjects relevant to professional needs.

To acquire skills for making measurements and handling apparatus.

To gather and analyse experimental data, both mathematically and graphically.

To be able to draw conclusions from observations and experiments.

To develop orderly thinking processes to solve problems.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Forest Industry Physics II — Course No. FI-115

Summary and material covered	Number of weeks
This is a continuation of Forest Industry I	
Fluid Mechanics will cover slides, liquids, gases, stress, strain, pressure, density Hydrostatics includes: guage and total pressure, Pascal hydraulic valves and press, Archimedes principle with hydrometers, buoyance, pressures by depths, capillarity surface tension and elevation head.	2
Hydrodynamics will include: Torricelli efflux speed from orifice, meters Venturi and pilot tubes, viscosity, settling rates and centrifuge, Bernoulli's equation, pressure heads, equation of continuity, rate of flow	2
Thermal Energy will include Ideal gas low, temperature scales Partial pressures, psychrometrics Internal energy and thermal content Thermal expansion and stress First low of thermodynamics, colorimetry Heat units, mechanical equivalents Sensible and latent heat, thermal capacity Types of thermal processes, thermal conductivity Heat transfer, optimum insulation, convention conduction radiation Refrigeration, compression system Heat engines, efficiency and second law Thermodynamics of cyclic engines	3
Exercises and problem solving relevant to mill situations	3
	10

Texts and/or references

"Introductory Applied Physics," 1972, or latest edition, McGraw-Hill
"Elements of Physics," 1972, or latest edition, McGraw-Hill
"College Physics," 4th edition, 1974, Wesley Sears, Zemansky and Young (Addision Wesley, publisher)
"Applied Physics," Beiser, Arthur, McGraw-Hill, 1976, Shaums outline series
"Basic Lubrication Practice," Allen F. Brewer, 1955, Reinhold Publishing Corp.
"Lubrication of Industrial and Marine Machinery," 2nd edition, 1961, by Forbes, Pope and Everitt, John Wiley and Sons, Inc.

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 3 Course Number FI 116 Date December 1981
Course Title Statistics & Quality Control II
Department Natural Resources
Hours per week: Lecture 3 Lab 2 Quarter Credits 4
Prerequisites Statistics and Quality Control I

Course Description (for catalog)

This course is a continuation of Statistics and Quality Control I. Further instruction is given in different types of statistical analysis to broaden this knowledge.

Additional practice is given in the application of statistical material for production improvement and to upgrade product quality.

Course Objectives

When these two courses are completed the student should be able to use elementary statistical methods to record, summarize, analyse and interpret statistical information. He will understand how statistical information is used to make inferences in the industry.

The student should also be able to read and understand more advanced and specialized statistical material and studies.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Statistics and Quality Control II — Course No. FI-116

Summary and material covered	Number of weeks
The use of various guages, measurements and scales to take statistical data	1
Examples and problems are given as concurrent to illustrate material and build upon skills	1
The different types of estimations are covered as those of the means, difference between means, standard deviation, proportions, differences between proportions	2
Hypothesis testing and testing procedures with the following tests: of the means, difference of means, concerning proportions, differences of proportions, contingency tables, chi-square distribution, goodness of fit	2
Analysis of paired data with method of least squares, coefficient of correlation and time series	2
Quality control, quality control monitoring and charting variables acceptance sampling, attributes and control charts	1
Nonparametric statistics as the sign test, runs test and rank-sum test	1
	10

Texts and/or references

"Statistics and Probability in Modern Life," Joseph Newmark, latest edition, Holt, Rinehart and Winston
"Elementary Statistics," Hoel
"Statistics," Spiegel, Shaums outline series

Suggested Student Equipment

Data clipboard
Statistical graph and chart paper

FOREST PRODUCTS TECHNOLOGY

Quarter 3 Course Number FI-117 Date December 1981
Course Title Drafting II
Department Forest Products
Hours per week: Lecture Lab 4 Course Credits 2
Prerequisites Program admission

Course Description (for catalog)

This course is a continuation of Drafting I and covers more practice in mechanical drawing. Work added includes isometric sketching and drawing, threads, fasteners, weld symbols a base design of a pump, flow sheets for the forest products industry.

Course Objectives

As a continuation of Drafting I the student is expected to improve his drawing skills.

1. Exercises are given to improve fundamental drawing techniques covered in Drafting I.

2. To attain a proper level of drafting skill to use in forest products employment.

3. To make the students familiar with forest products equipment and processes.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Drafting II — Course No. FI-117

Summary and material covered	Number of weeks
Practice exercises will include:	
Isometric review Isometric plant layout for sawmill	1
Threads, fasteners weld symbols Pipe clearance descriptive geometry	1
Introduction to dimensions, views, sections, anchor bolts, pump seals, structural steel basic shapes, concrete grout, welding	1
Debarking pump base design Flow sheets introduction covering sawmill and plywood plant	1
Field visits to see and take notes for an actual operating sawmill or plywood plant	5
Projects to construct: one selected sawmill flow sheet one plywood plant flow sheet one laminated beam flow sheet one particle board or chip board mill flow sheet	
	10

Texts and/or references

"Process Piping Drafting," by Weaver
"Structural Detailing for Technicians," Weaver
Descriptive geometry text

Suggested student equipment

Drafting I student equipment
Architectural Scales, Isometric template
Isometric paper, 1"B" (A3 metric) 11x17 mylar with N3 lead; 2 "C" (A^2 metric) vellum 17x22 with title block; 2 "B" (A^3 metric) vellum 11x17 plain

FOREST PRODUCTS TECHNOLOGY

Quarter 3 Course Number FI-118 Date December 1981
Course Title Wood Properties
Department Forest Products
Hours per week: Lecture 2 Quarter Credits 4
Prerequisites Third Quarter standing, Statistics and Quality Control I and II

Course Description (for catalog)

This is a laboratory course to demonstrate the various properties of wood.

Properties covered by exercises are: wood and chip calculations, mechanical properties, rheological properties, micro and special structures, chemical properties.

Course Objectives

1. The student is expected to acquire an understanding of chemical, mechanical, physical properties of wood.

2. The student must acquire a skill in laboratory techniques to measure and investigate properties of wood.

3. The student is expected to complete an appropriate project then give a written and oral report on his topic.

4. Perform group experiments designed to illustrate certain wood properties.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Wood Properties Course No. FI-118

Summary and materials covered

This course covers lectures, instructions and laboratory exercises covering various properties of wood.

These properties and exercises include:

1. Wood and chip calculations
2. Mechanical properties of wood
3. Rheological properties
4. Micro and special structures
5. Chemical properties

Detailed characteristics covered in these exercises include:

1. Specific gravity
2. Moisture content determination, electrical and oven methods
3. Shear, bending, compression
4. Wood preservation, wood penetration of chemicals
5. Wood chemical extraction

10

Texts and/or references

"Textbook of Wood Technology," volume 1, by Panshin and deZeeuw, 2nd or latest edition.
Selected wood products laboratory exercise manual.

Suggested student equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI-119 Date December 1981
Course Title Production Management I
Department Forest Products
Hours per week: Lecture 2 Lab 2 Quarter Credits 3
Prerequisites Program admission

Course description (for catalog)

This study covers various elements of method study. It includes: fact gathering, different types of charting, sampling activity, measurement of work and economy of motion, concepts of materials handling, plant layout, and the control. Techniques of PERT and CPM are introduced. Application examples to mill operations are included in the instruction.

Course Objectives

The objective of this course including both production management I and II, is to give the student a systematic method of problem analysis and solving. Emphasis is on mill operation problems. The further objective is to emphasize the three elements of all problems or projects: technical, economic and social. The student should be able to recognize and develop the production team cooperation and self problem approach among all operations personnel.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Production Management I — Course No. FI-119

Summary and Material covered	Number of weeks
Introduction and objectives Outline of work, assignments, reading, concepts The study of work, activity breakdown, definitions Operations productivity, the productive attitude approach to all work Productivity and lifestyle, the standard of living The importance of human relations. The vital necessity of properly dealing with people	1
The study of work The 6 stages in the use of method study Recording data methods Charting symbols Charting flow processes	1
Study of work continued Progress charts outlining Charting conventions Process operation charts Two-handed process charts Multiple activity charts	3
Examination systems Simplified critical examination	1
Motion economics Motion economy principles Movement classes	1
Sampling Activity Activity sampling principles Conduction of the study With the aid of statistics: sample size, accuracy, confidence level and control charts Work measurement use with activity sampling	3
Working with people to improve operations Sampling and work studies as aids to profitability, wage enhancement and security The team approach to increased efficiency	1
	11

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI-120 Date December 1981
Course Title Advanced Technical Communications
Department Forest Products
Hours per week: Lecture 3 Quarter Credits 3
Prerequisites: Technical Communication FI-101 and Descriptive Writing and Oral Reports FI-110

Course Description (for catalog)

This course continues writing and oral instruction of the previous communication courses. It covers and emphasizes practice of: organizing reports, use of proper report methods and formats, writing outlines, abstracts, giving oral reports, writing business letters and practice throughout of better sentence structure, language use and style.

Course Objectives

The objective is to further develop skills in effective technical writing. To practice clarity of exposition and teach useful technical writing formats. The continuing objective is to improve the student's ability to select appropriate formats and develop organized patterns of writing.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Advanced Technical Communication — Course No. FI-120

Summary and material covered	Number of weeks
Analysing Communication Problems Assignment Memo Avoid: Filler words and phrases, ambiguity, affectation, cliches, gobbledegook, use best word choice	1
Fundamentals of report writing, formats, methods, process Write a progress report	1
Review of reading and study skills, condensations Write an abstract from an article of interest as arranged with the instructor	1
Report Organization. Methods of development and selection Analyse, compare, define, break down into logical order and sequence Write an outline	2
Oral Reports: select and organize a topic, delivery, use of graphic aids Give an impromptu oral report	1
Student presentations of technical reports--15 minutes each	2
Business correspondence--the letter Business writing style Write a business letter	1
Practice in language use and style Special emphasis on clarity and using the best word Write a summary and memo	1
Special emphasis on more effective sentence construction The assignment is to rewrite sentences provided by the instructor	1
	11

Texts and/or references

"Handbook of Technical Writing," by Brusow, Alred and Oliu
"Guide to Research and Report Writing," by James L. Atteberry and Ruth D. Atteberry
copywright, 1974, Pepperdine University, Tanis Books, Inc.
725 West Jefferson Blvd
Los Angeles, CA 90007

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI-121 Date December 1981
Course Title Manufacturing with Wood I
Department Forest Products
Hours per week: Lecture 2 Lab 6 Quarter Credits 4
Prerequisites Successful completion of first 3 quarters of Forest Products curriculum

Course Description (for catalog)

This course covers a variety of sawmill types and procedures including field observation of different types of mills. Log processing to finished lumber manufacture is followed through. The various steps of manufacture, including operation, evaluation and studies of the various pieces of equipment and equipment operation processing of the production.

Course Objectives

The course objectives are to enable the student to:

--identify/describe lumber manufacturing equipment

--know how this equipment operates

--compare lumber processing systems

--evaluate saw filing, saw adjustment and sawing practices

--monitor and run statistical studies (from statistics courses) on product quality and recovery

--identify wood processing problems

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE OUTLINE Manufacturing with Wood — Course No. FI-121

Summary and material covered — Number of weeks

Field trips will be combined with lecture to cover different types of sawmills, equipment manufacturers, saw filing facilities and wood planers. Time will be spent on: all portions of lumber manufacture, maintenance procedures, saw manufacture, saw sharpening, feed rates, alignment, planing and finishing lumber, checking quality and recovery, optimizing recovery and grade yields.

Major topic emphasis by week are:

Introduction and log preparation	1
First log breakdown	1
Secondary log breakdown	1
Rough trimming, cross cutting, sawmill remanufacturing	1
Saw filing technology	3
Planing, sanding, finishing lumber	1
Controlling quality, optimizing recovery and quality	1
The differences between inland, coastal, the new more automated and small log mills	2
	11

Texts and/or references

"Lumber Manufacturing," Ed. M. Williston, Miller Freeman, latest edition, 81 or 82
"Saw Feeds and Speeds," P. S. Quelch; "Saw Filers Handbook," P. S. Quelch; and "Carbide Filers Handbook," Jeff Hewell of Armstrong Manufacturing Company, Portland, Oregon
"Wood Processing Machinery," Peter Koch

Suggested Student Equipment

Clipboard, note taking equipment, 8-foot tape measure

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI 122 Date December 1981
Course Title Production Support Activities I
Department Forest Products
Hours per week: Lecture 5 Quarter Credits 5
Prerequisites Completion of first three quarters of Forest Products curriculum

Course Description (for catalog)

This course covers important aspects of mill operation not directly involved in production activities. Included are: supervision principles, industrial relations, cost analysis, accident and fire prevention.

Course Objectives

The objectives are for the student to become familiar with specified functions involved in sawmill and plywood management. The more specific detailed objectives of the student are to:

--be able, with basic accounting data, carry out calculations related to mill performance budgeting, capital spending, profit analysis

--be familiar with mill supervision responsibilities, the difference between a foreman's and superintendent's responsibilities

--be able to set up a fire and accident prevention program

--be able to investigate and fairly solve simple labor management disputes

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Production Support Activities — Course No. FI-122

Summary and material covered	Number of weeks
Principles of Supervision to include: Leadership, communication Motivation and team cooperation Efficient use of time Role of supervisor Case studies used to illustrate above	3
Cost Analysis and accounting Cost terminology and costing calculations Process costs with break even calculations Break even points and calculation of return Cost codes, analysis, payback, gross profit Capital expenditures with calculations of return on investment	3
Accident Prevention, OSHA and WISHA regulations What management should do, union cooperation, responsibility of all employees Safety attitudes, the mill safety program Protective equipment Emergency procedures Safety and noise investigation	2
Fire prevention, insurance, sprinkler systems Emergency evacuation routes In-house fire fighting equipment, fire suppression	1
Industrial Relations, Master Union Agreements Warnings, grievances, stewards Union-management problems case studies	2
	11

Texts and/or references

Washington Workman's Compensation information
"International Workers of America," master agreement
"Fundamentals of Accounting Principles," Pyle, White and Zin
"Budgeting and Profit, Planning and Control," F. A. Welsch
"Organizational Psychology," B. M. Bass
"Industrial Relations for Supervisory Personnel," C.M.A.
"Cost Accounting," Matz, Curry, Frank
"Cost Accounting," Principles and Practice, J. J. W. Neuner

Suggested Student Equipment

Hard hats, supplied by school, to be used during any presence in mills or any place working rules reuqire.

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI-123 Date December 1981
Course Title Mechanical Mill Equipment
Department Natural Resources
Hours per week: Lecture 5 Lab 0 Quarter Credits 5
Prerequisites Successful completion of first 3 quarters of Forest Products curriculum

Course Description (for catalog)

This covers instruction in the use and characteristics of mechanical equipment found in present wood conversion mills or sawmills, plywood mills, veneer and particle board mills, work with manufacturers' information, mill manufacturers' plant study tours are included.

Course Objectives

The student is expected to become thoroughly familiar with mechanical production equipment used in forest product mills.

1. He is expected to know what each piece of equipment is used for.
2. He is expected to know the advantages and disadvantages of each kind of equipment.
3. He is expected to know the requirements for proper operation and maintenance of this equipment.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Mechanical Mill Equipment Course No. FI-123

Summary and material covered

Gears and Gearing
Law of gearing, year tooth profiles, gear trains, gear lubrication, gear terminology

Speed Drives, constant and variable
Fluid couplings, eddy current couplings
Variable drives

Hydraulic systems
Systems equipment and applications
Positive displacement, theory and types

Pumps
Centrifugal pump theory, H-Q curves, efficiency system courses, pump in parallel and series operation. Pipe friction, uses of centrifugal pumps in sawmills, plywood and other wood manufacturing activities. Try to visit a nearby pump company.

Air Compressors
How air compressors work, theory of operation
Intercooled axial flow machines, multi-stage units, positive displacement compressors, vane and lobe types, air operated equipment, pneumatic systems

Bearings, plain and antifriction types, applications and selection
Lubrication and lubrication theory, oil and grease lubrication
Installation and care of antifriction bearings

Steam Power-Generation and use of steam in industrial installations, dry kilns for lumber, heat exchangers, condensate systems, power generation, mechanical drives for boiler feeds, barker pump drives, fan drives and other applications

Equipment for handling materials as: conveyors, belts, bucket elevators, chair flight, pneumatic types, lift trucks-fork and straddle. Lumber, chip and waste handling methods.

Texts and/or references

"Manual of Instruction for the Millwright Trade," Parts I and II, published by Division of Vocational Curriculum, Dept of Education, British Columbia, Canada.
"Basic Lubrication Practice," by Allen F. Brewer, Reinhold Publishing Company, Park Avenue, New York, 1955 or latest edition.
"Lubrication of Industrial and Marine Machinery," by the late William Gordon Forbes, revised by C. L. Pope and W. T. Everitt, John Wiley and Sons, Inc., 1961 or latest edition.

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 4 Course Number FI-124 Date December 1981
Course Title Computer Uses
Department Forest Products
Hours per week: Lecture 2 Lab 2 Quarter credits 3
Prerequisites Successful completion of first 3 quarters of Forest Products curriculum

Course Description (for catalog)

This is an introduction to computers, their uses in small and large companies, production, commercial and scientific applications. Computers with logic development and the flow charting techniques. Covered are the relationships of data to input and output, the use of BASIC, FORTRAN COBOL and other languages. There are exercises in writing programs individually and a group. Packaged programs are demonstrated on a mini-computer.

Course Objectives

The objective is to provide forest products students with an understanding of the uses of the computer and its value as a tool to monitor activities and solve problems. It is also an objective to encourage the acceptance and uses of computers in Forest Products work.

Students are encouraged to take more computer instruction after the end of this curriculum if they show the talent and motivation for going on in this specialty. The additional objective here would be to supply some people, who, with an understanding of the forest products industry, can develop into forest products manufacturing computer programmers.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Computer Uses — Course No. FI-124

Summary and material covered	Number of weeks
How does the computer work? Typical computer usage in various sized companies Justifications for: accounting, engineering, scientific, business and combinations, operations research, requirements for a common data base Use of predeveloped programs	2
Development of logic Development of algorithms in logical step sequence Use of flow charts Introduction of actual problems in industry Design and implementations of computer programs	3
Pro-ramming Introduction to BASIC, FORTRAN, COBOL Approach to program writing, emphasizing basic Data input and output format relationship Have programs written by specialists Program testing, sub-programs and individual tests Collection of data with considerations of accuracy, range, sensitivity, validity Methods of ensuring continuous use of continuous revision of data for actively used programs	3
Economic aspects of computer use Criteria for computer use on problems Hardware and software requirements Selection of a computer Use of tables and arrays in a computer	3
	11

Texts and/or references

Applied FORTRAN programming with standard FORTRAN, WATFIV, and FORTRAN IV and structured WATFIV by M. J. Merchant
Use of various manufacturers' instruction texts

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-125 Date December 1981
Course Title Electrical Equipment
Department Forest Products
Hours per week: Lecture 8 Quarter credits 8
Prerequisites Successful completion of proceeding 4 quarters of Forest Products curriculum

Course Description (for catalog)

This is an introduction to industrial electrical equipment with emphasis on those used in wood product manufacturing. Included are D.C. and A.C. and their application in sawmills and plywood mills. Distribution equipment, protective equipment and metering equipment are included. Covered are electrical system characteristics, importance of power and safety.

Course Objectives

The student is expected to be familiar with the electrical equipment and electrical systems in the mill. This is necessary to plan properly and maintain electrical systems, safety programs, cost of operations and modification with electrical specialists.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Electrical Equipment — Course No. FI-125

Summary and material covered	Number of weeks
Basic theory, energy, volts, amps, power Series, parallel circuits, AC, DC Impedence, reactance, resistance, reactive power, true power, apparent power, power factor Example problem, three-phase voltage generation	2
Three phase characteristics and terminology with example problems in three phase, wye and delta systems Theory and characteristics of transformers, instrument transformers and applications, fuses, breakers Three-phase voltage levels, single-line diagram and single-line diagram project	3
Theory, applications and characteristics of induction motors DC motor, synchronous motor	2
Motor protection and control, safety regulations Safety provisions, grounding	1
Remote control circuits, energy demand, protective devices	1
Economic considerations	1
	10

Texts and/or references

None assigned

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-126 Date December 1981
Course Title Advanced Technical Communication II
Department Forest Products
Hours per week: Lecture 2 Quarter Credits 2
Prerequisites Technical Communication FI-101, Descriptive Writing and Oral Reports, and Advanced Technical Communication II

Course Description (for catalog)

Covered will be writing and rewriting assignments for various employment-related needs. This will be accompanied by lectures and format handouts. Included will be the organization of writing and emphasis on: clarity, preciseness of meaning in: letters, short reports, memos.

Concentration will be on: economy of words while retaining full meaning, basic language skills, sentence construction and oral presentations.

Course Objectives

The objectives are to:

--teach needed formats for technical employment communication

--to further develop skills in clear, concise, effective writing

--to further improve the students' basic language use skills

--to provide more practice to improve format selection abilities for various uses

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Advanced Technical Communication II — Course No. FI-126

Summary and materials covered — Number of weeks

Topics and assignments include:

- Application forms, resumes
- Letters of application
- Interview practice
- The grievance letter, grievance memo
- Meetings and minutes, obtaining the facts and essence of meetings
- Review of grammer, punctuation, spelling and use in all writing assignments, rewriting for improvement
- The pollution report, the special project report
- Field trip to coast mills report
- The use of logic in sentences, development of a theme, bias, persuasion
- Special attention to: opening statements, closing statements
- Abstracts of larger reports or articles

10

Texts and/or references

Handouts and special examples selected from actual work situations
Texts as selected by instructor

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-127 Date December 1981
Course Title Linear Programming with Computers
Department Forest Products
Hours per week: Lecture 3 Lab 3 Quarter credits 5
Prerequisites Computer uses FI-124 and taken concurrently with Beginning Micro Computer Operation FI-128.

Course Description (for catalog)

This course is a continuation of Computer Uses going into more detail. Practical problems are used to illustrate actual industrial situations using computers to formulate and organize problems for solution and analysis of results. Packaged programs are featured. Emphasis is on selecting and helping computer specialists set up problem solving and monitoring programs. Various kinds of data processing equipment are compared, their advantages and disadvantages for various applications.

Course Objectives

The objective is to provide the student with a more detailed working knowledge of practical techniques using computers and linear programming. The student should learn to recognize practical applications in the forest industry, limitations and advantages of utilizing computers, be capable of analysing and interpreting results. He should be able to work with systems analysts, and communicate effectively on this topic with mill management and data processing specialists.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Linear Programming with Computers — Course No. FI-127

Summary and material covered — 10 weeks

Topics covered are:
Graphical methods of linear programming with a graphical lineal program solution problem

The simplex method of linear programming with a problem solution using the simplex method

Solution of simultaneous equations with more unknowns than equations
Emphasis is to be able to draw inferences without getting lost in the mathematics

The student is made familiar with concepts as: optimization with secondary objectives, "shadow prices," "reduced costs," that a desired or designed plan may yield more practical results through careful analysis
The value of using a standard input is also outlined
Difficulties encountered in more complex problems with more extensive data gathering
Analysis of computer results and preparation of findings report for management
If management disagrees with findings the student should be able to trace cause and effect and back up his findings with elements of matrix, shadow prices and reduced costs
Review of cost ranging, confidence limits of data, parametric programming, sensitivity analysis and validity of solution
Nonlinear and integer programming are discussed
Choose a proper technique to solve a problem
A linear programming project based on a real log allocation and production problem in a mill complex

Texts and/or references

"Linear Programming: an Emphasis on Decision Making," Ann J. Hughes and Dennis E. Grawiog, Addison-Wesley, Reading, Mass., 1973
"User's Guide to Linear Programming," H. G. Daellenback and E. J. Bell, Prentice-Hall, 1970, Englewood, New Jersey
"Quantitative Analysis for Business Decisions," H. Bierman, C. P. Bonini and W. H. Hausman, 5th edition, Irwin, 1977, Homewood, Illinois
"MSLP Linear Programming Package; Users Manual," Burnaby Dept of Education, 1973

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-128 Date December 1981
Course Title Beginning Micro Computer Operation
Department Forest Products
Hours per week: Lecture 0 Lab 5 Quarter credits 2
Prerequisites Computer uses and successful completion of first 4 quarters of Forest Products curriculum

Course Description (for catalog)

This is an applied orientation to computer use that emphasizes hands on computer operation practice. Covered are the basic components of micro computer use, how to run a BASIC program with practice on key words, input, output, editing, looping, graphics, subroutines, arrays, basic programming, use of prepared programs on discs, use of computer memories.

Course Objectives

The objective is for the student to become more familiar with the: use, advantages and limitations of computers. Further objectives are for the student to learn how to use a micro computer in preparation for further development of computer skills. With further practice the student will be able to use and construct simple programs to aid in quality control and monitoring of processing activities.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Beginning Micro Computer Operation Course No. FI-128

Summary and material covered 10 weeks

Introduction to micro-computer use, an overview, how to
run a microcomputer
The mechanics of operating a micro-computer
Elements of the BASIC language
BASIC statements, commands, key words
Arithmetic and arithmetic operations in BASIC
Developing and storing programs
Branching statements, looping, graphics, read data statement, subroutines, arrays, operational modes, system commands for modifying, debugging, saving, loading, verifying, editing programs. Time permitting also covered are: variables, type declarations, type conversions and accuracy, error detection, exponentiation, formatting output, memory allocation and string manipulation.

Texts and/or reference

"Basic Programming Student Manual," parts I and II, by Radio Shack, or competitive equivalent

Suggested Student Equipment

Exercise sheet handouts

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-129 Date December 1981
Course Title Production Management II
Department Forest Products
Hours per week: Lecture 2 Lab 2 Quarter credits 3
Prerequisites Program admission

Course Description (for catalog)

This course is a continuation of Production Management I. A good portion of this second half of the course is spent in the field, in mills. Techniques learned in the first quarter of the course are applied. The student is required to prepare a term paper on assignment. He can expect to spend the additional time necessary outside of class and laboratory for his field project.

Course Objectives

The objective of the second quarter of this course is to complete the objectives set forth in Production Management I. This is accomplished by learning added supportive material, observation and practice in the field, assembling and reporting findings.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Production Management II — Course No. FI-129

Summary and material covered	Number of weeks
Measurement of Work Time studies, standard data, PMTS, synthesis Analytical estimating, rating concept Use of the stop watch Normal time allowances, standard time	2
Diagramming networks PERT and CPM Use of CPM as a planning anc control tool Make a CPM chart Use of value engineering and value analysis	1
Plant production layout and handling of materials Principles of efficient materials handling practice Procedure for systematic layout planning	
Special project for the balance of the quarter Students will work in the mills, or in mechanical shops. The project preferably be of thieir own choice. The purpose is to apply what has been learned in class and submit his study as a term paper upon project completion by the end of the quarter	7
	10

Texts and/or references

The same as Production Management I

Suggested Student Equipment

The same as Production Management I

FOREST PRODUCTS TECHNOLOGY

Quarter 5 Course Number FI-130 Date December 1981
Course Title Manufacturing with Wood II
Department Forest Products
Hours per week: Lecture 2 Lab 2 Quarter credits 3
Prerequisites Successful completion of 4 proceeding quarters in Forest Products curriculum

Course Description (for catalog)

This course includes all phases of softwood plywood manufacturing. Covered in addition to actual production are: quality control methods, productivity monitoring and recovery. West Coast and Inland Empire conditions and differences in product are compared.

Course Objectives

The objective of this course is to prepare the student to work in plywood manufacturing. In order to be of value to plywood manufacturing he should be able to:

--be knowledgeable in and compare plywood manufacturing practices

--identify and know the functions of equipment used to manufacture plywood

--perform recovery and quality control functions

--identify and solve problems in plywood manufacture

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Manufacturing with Wood — Course No. FI-130

Summary and material covered	Number of weeks
Introduction to plywood manufacturing systems with terminology used in the business	1
Log grades used for plywood and grades for various plywood components. Log purchase and sorting Log peeling and green sheets	1
Recovery, recovery methods, green sheet stitching Drying Veneer grades	1
Lay-up procedures, which grade goes into which ply Glue formulations, glue mixing and application Glue curing by heat, cold set and electronics Resins, filling and sanding	3
Quality controls throughout manufacture	2
Laboratory plywood manufacture and testing (Field trips to plywood plants and problem solving exercises are included)	2
	10

Texts and/or references

"Plywood Manufacturing Processes," R. R. Baldwin
"Lathe Operators Manual," Parts I and II, W. V. Handcock, J. R. T. Hailey and O. Feihl

Suggested Student Equipment

Hard hats to be supplied by school

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-131 Date December 1981
Course Title Production Improvement Case History Studies
Department Forest Products
Hours per week: Lecture 2 Lab 4 Quarter credits 4
Prerequisites Successful completion of previous 5 quarters of Forest Products

Course Description (for catalog)

This course is one of guided but otherwise independent investigation of practical operational problems. By arrangement with the instructor there should be one case history with problem study of the following:

A sales or distribution situation

A production process

A maintenance problem

Evaluation of a new industry development

Course Objectives

The objectives of this course are to:

--put together and make practical use of previous training

--further improve skills of communication, observation, analysis and report writing

--to work out at least one practical problem for a prospective employer with a view to enhance employment prospects

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Production Improvement Case History Studies — Course No. FI-131

Summary and material covered	Number of weeks
Sales and distribution situations with selection and execution of topic examination and critique	2
Production process selection and execution of topic examination and critique	2
Maintenance problem selection and execution of topic examination and critique	2
Evaluation of a new industry development selection and execution of topic	2
Preparation and rewrite of a selected above topic to present to a prospective employer, re-examination and critique before presentation to a prospective employer	2
	10

Texts and/or references

Draw from all sources

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-132 Date December 1981
Course Title New Technology Development
Department Forest Products
Hours per week: Lecture 3 Lab 0 Quarter Credits 3
Prerequisites Successful completion of previous 5 quarters of Forest Products

Course Description (for catalog)

This course will cover new developments and technological advances recently made in the industry in the past decade or so or are in our view being prepared for adoption by the forest industry. Included are: laser saw cut marking beams, computerized calculations and automated control of "best opening face" log and sequence cuts for best yield, production sequence automation, green chain automation, precision saw controls, complete small log breakdown by "chip-n-saw" and similar equipment, use of extra thin saws and other developments as they surface.

Course Objectives

The first objective is to have the student become familiar with new and coming technological developments for the forest products industry. The second is to evaluate efficiency and cost benefits these new developments may bring to operations. The third objective is to alert the student to the potentials of new developments to come. If the student is creative he may be able to contribute to new developments and inventions.

NOTE: The instructor will have to investigate and update his list of new developments when he starts the course to include the latest technological advances.

New developments in the industry are explained, and described in summary.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE New Technology Developments Course No. FI-132

Summary and materials covered

New developments in the industry are explained, and described. Their role and benefits to operations are discussed and examined. Emphasis will be on finding ways to profitably adopt the new technology and processes to specific mill production configurations. Manufacturers and researchers are invited to make their new development presentations. New developments are examined and evaluated for their cost and efficiency characteristics. Students are encouraged to critically seek new developments and develop a creative outlook for when they enter employment. Some developments covered are: laser saw cut marking beams, computerized calculations and automated control of "best opening face" log and sequence cuts for best yield, green chain automation, precision saw controls, complete small saw log breakdown by "chip-n-saw" and similar equipment, use of extra thin saws, and other developments as they surface.

Texts and/or references

Manufacturers' and research releases

Suggested Student Equipment

None

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-133 Date December 1981
Course Title Manufacturing with Wood II
Department Forest Products
Hours per week: Lecture 2 Lab 4 Quarter credits 4
Prerequisites Successful completion of Manufacturing with Wood I

Course Description (for catalog)

This course is a continuation of Manufacturing with Wood I. It includes the manufacture of particle board and wood seasoning. Particleboard covers specifications of wood particles, mixing, use of binders and resins, pressure treatments, surfacing and quality control. Wood seasoning includes air drying but primarily kiln drying methods related to wood properties and types of dry kilns with proper monitoring and quality control.

Course Objectives

The objectives are that the student will understand, be able to knowledgeably contribute to the processing and quality control of particle board and proper seasoning of wood. He should be able to:

--know the seasoning properties of wood

--know and prevent seasoning defects

--evaluate and classify drying methods and dry kilns

--perform necessary quality control functions

--supervise the production of proper quality seasoned lumber

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Manufacturing with Wood II — Course No. FI-133

Summary and material covered	Number of weeks
Particleboard manufacturing Specifications of wood particles used Equipment and processes used Mixing, use of binders and resins Pressure treatments, surfacing, quality control	2
Wood seasoning, air drying and dry kiln use Factors influencing the seasoning of wood Seasoning defects and their prevention Advantages of using continuously rising temperature High temperature drying Dry kiln operation, monitoring and maintenance Quality controls before, during and quality checks after drying	1
Overall topics covered by weeks:	
Fundamentals of wood seasoning, and Wood properties related to seasoning	1
Seasoning defects, how to prevent seasoning defects	1
The dry kiln, types, operation, maintenance	1
Kiln drying methods	1
Improved kiln drying methods	1
Finishing dried lumber	1
Quality control of kiln dried lumber	1
	10

Texts and/or references

"Dry Kiln Operator's Handbook," U.S. Handbook No. 188

Suggested Student Equipment

Hard hats when visiting mills supplied by school

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-134 Date December 1981
Course Title Production Support Activities II
Department Forest Products
Hours per week: Lecture 2 Lab 4 Quarter credits 4
Prerequisites Successful completion of Production Support Activities I

Course Description (for catalog)

This course includes many necessary activities in the mill that are not directly part of the production processes. Covered are: pollution control problems, mobile equipment use and justification, mill maintenance and setting up a mill maintenance program.

Course Objectives

The objective is to find the functions pertaining to sawmill and plant maintenance, and pollution control problems, also special concerns of mobile equipment. The more specific objectives are as follows:

1. The student must be able to set up a complete maintenance program.

2. The student must be able to identify mill pollution problems, compare and select indicated abatement procedures.

3. The student should be able to economically justify all types of mill mobile equipment from given materials handling data.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Production Support Activities II — Course No. FI-134

Summary and material covered	Number of weeks
The organization of maintenance Preventive maintenance and preventive maintenance lubrication Division of responsibility and authority with a system of follow up checks Nondestructive testing How to organize and set up a coordinated maintenance system Boiler maintenance, dry kiln maintenance Specific maintenance tours and case studies	3
Mobile equipment, kinds of mobile equipment Considerations of safety, economics and selection Tour of tractor, crane and lumber carrier company	2
The maintenance trades Electronics and electronic controls, welding, hydraulics, wire rope, rigging	2
Pollution control Water pollution, sewage treatments, tour of sewage treatment plants Air pollution, stack precipators and scrubbers EPA air and water regulations and standards Waste wood burners, use of waste wood and bark to generate power	3
	10

Texts and/or references

EPA regulations and specifications
"Effective Maintenance Management," by E. T. Newborough
Welding safety manuals
Wire rope and rigging manufacturers' safety and use manuals
Heavy mobile equipment use and safety manuals

Suggested Student Equipment

Hard hats to be supplied by school

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-135 Date December 1981
Course Title Wood Products Sales and Distribution
Department Forest Products
Hours per week: Lecture 5 Lab 0 Quarter Credits 5
Prerequisites Successful completion of preceding 5 quarters of forest products curriculum

Course Description (for catalog)

Covered are all those aspects of the business between manufacture and delivery to the customer. The vital importance of sales and service is stressed. Individual topics include: trade channels, supply and demand, pricing, credit, financing sales, contracts, handling complaints, shipping, rail routing, trucking, bills of lading, barging, unitizing, warehousing and distribution, inventory control and packaging.

Course Objectives

The objective is for the student to recognize the vital importance of sales and distribution; that nothing happens in logging and milling until something is sold.

A second objective is for the student to become knowledgeable about: trade channels, supply demand, credit, financing sales, contracts, handling complaints, shipping, rail routing, trucking, bills of lading, barging, unitizing, warehousing and distribution, inventory control and packaging.

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Wood Products Sales and Distribution — Course No. FI-135

Summary and material covered — 10 weeks

Introduction to sales and distribution
The importance of sales and best service
The importance of product knowledge in sales
Building a customer confidence and contact network

Supplies of wood products, the relationship by regions of the country and competition

Market demands, domestic and export

Trade channels: the wholesaler, retailer, exporters, agents, the futures market

Trade practices and terms of sale, terms and conditions in Washington

Contract Forms: FOB, FAS, etc.
Customary units of sale and measurement practices

Law related to: contract basics, breach of contract, specific performance, injunctions, transport of goods by sea

Finance and banking considerations to include: sources and types of financing, cash flow, discounted cash flow, rate of return, discounting, collections, letters of credit, foreign exchange

Insurance types of coverage with options of purchase, marine insurance

Complaints, claims, arbitrations, handling procedures

Definitions of used terms, budgeting

Industry planning to future sales

Distribution, significance, modes of transport

Export shipping, types of vessels, shipping agents, chartering

Rail routing, traffic, demurrage, free time, car supply, lead restrictions

Trucking, rates, payment, lead restrictions, equipment types, competition

(cont)

Quarter 6
Wood Products Sales and Distribution — Course No. FI-135
Summary and material covered (cont)

Barge and Coastal Transport
Unitizing, methods of loading, protection coverage

Documentation by: bills of lading, contracts of sale, invoices, customs documents, certificates of origin

Warehousing and distribution inventory control and packaging

Industry changes, expectations for the future
(Visits to barge loading, rail shipment preparation, and warehouse)

Texts and/or references

"Reading in Physical Distribution," edited by Hale C. Bartlett
"Traffic Management," by Kenneth V. Flood
"Industrial Traffic Management," by Wagar, Colton and Ward
"Contemporary Physical Distribution," by Johnson and Wood
"Management of Physical Distribution and Transportation," by Charles A. Taff

Suggested Student Equipment

Hard hats for field visits supplied by school

FOREST PRODUCTS TECHNOLOGY

Quarter 6 Course Number FI-136 Date December 1981
Course Title Organize an Employment Campaign
Department Forest Products
Hours per week: Lecture 1 Lab 0 Quarter credits 1
Prerequisites Successful completion of previous quarters of Forest Products

Course Description (for catalog)

This course covers an inventory of training, personal assets, then their application in constructing an employment campaign. Included are: decide what you want to do, put together a plan, obtaining help, identify the person who can make your employment decision, survey of employment possibilities in the forest industry.

Featured are industry personnel managers and supervisory people to explain what they are looking for and how to package oneself to fill their requirements.

Course Objectives

The objective is to put together and execute an employment campaign that results in the student's employment as a technical or junior supervision employee for a forest products company.

Subobjectives include:

1. Student inventory of his talents and interests
2. Student organization of an employment campaign
3. Student execution of that campaign

FOREST PRODUCTS TECHNOLOGY OUTLINE

COURSE TITLE Organize an Employment Campaign — Course No. FI-136

Summary and materials covered — Number of weeks

Self-asset inventory

What do you want to do?

Where do you want to do it?

Identify potentially fruitful industrial activity
- Organize a campaign procedure, resumes, letters, personal contacts
- Select that employment decision maker
- Schedule interviews
- Follow up in all cases, the tactful second follow-up
- Salary, benefits and duties questions

10

Bon voyage!

Texts and/or references

"What Color is Your Parachute?" by Richard Nelson Balles
"A Practical Manual for Job-Hunters and Career Changes," 1979, or latest edition, Ten Speed Press, Box 7123, Berkeley, CA, 47707

Suggested Student Equipment

None